Report Information from Dialog DataStar

Table of Contents

A fast and robust approach to lane marking detection and lane tracking.

Accession number & update
0010052063 20080725.
Conference information
2008 IEEE Southwest Symposium on Image Analysis and Interpretation,
Santa Fe, NM, USA, 24–26 March 2008.
Source
2008 IEEE Southwest Symposium on Image Analysis and Interpretation, 2008, p. 57–60, 10 refs, ISBN: 978–1–4244–2296–8. Publisher: IEEE, Piscataway, NJ, USA.
Author(s)
Lipski–C, Scholz–B, Berger–K, Linz–C, Stich–T, Magnor–M.
Author affiliation
Lipski, C., Scholz, B., Berger, K., Linz, C., Stich, T., Magnor, M., Comput. Graphics Lab., Tech. Univ. Braunschweig, Braunschweig, Germany.
Abstract
We present a **lane** detection algorithm that robustly **detects** and tracks various **lane markings** in real–time. The first part is a feature detection algorithm that transforms several input images into a top view perspective and analyzes local histograms. For this part we make use of state–of–the–art graphics hardware. The second part fits a very simple and flexible **lane** model to these **lane marking** features. The algorithm was thoroughly tested on an autonomous vehicle that was one of the finalists in the 2007 DARPA Urban Challenge. In combination with other sensors, i.e. a lidar, radar and vision based obstacle detection and surface classification, the autonomous vehicle is able to drive in an urban scenario at up to 15 mp/h.
Descriptors
COMPUTER–GRAPHIC–EQUIPMENT; FEATURE–EXTRACTION; **ROAD–**VEHICLES; TRACKING.
Classification codes
B6135 Optical–image–and–video–signal–processing*;
C7445 Traffic–engineering–computing*;
C5540 Terminals–and–graphic–displays;
C5260B Computer–vision–and–image–processing–techniques.
Keywords
lane–marking–feature–detection–algorithm; **lane–**tracking; state–of–the–art–graphics–hardware; autonomous–vehicle.
Treatment codes
P Practical.
Language
English.
Publication type
Conference–paper.
Publication year
2008.
Publication date
20080000.
Edition
2008029.

A synchronous detection of the road boundary and lane marking for intelligent vehicles.

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0009868323 20080426.
Conference information
2007 8th ACIS International Conference on Software Engineering, Artificial Intelligence, Networking, and Parallel/Distributed Computing, Qingdao, China, 31 July–1 Aug. 2007.
Source
2007 8th ACIS International Conference on Software Engineering, Artificial Intelligence, Networking, and Parallel/Distributed Computing, 2007, p. 741–5, 8 refs, ISBN: 0–7695–2909–7. Publisher: IEEE, Piscataway, NJ, USA.
Author(s)
Weina–Lu, Haifang–Wang, Qingzhu–Wang.
Author affiliation
Weina Lu, Haifang Wang, Qingzhu Wang, Hebei Normal Univ. of Sci. & Technol., Qinhuangdao, China.
Abstract
To prevent an intelligent vehicle from departing the **lane** in the vision–based navigation, an integrated method based on image processing is proposed to **detect** the **road boundary** and **lane marking** synchronously in structural **road** environment. The feature of the **road boundary** is extracted by means of gradient magnitude and gradient direction of pixels. And the **lane marking** feature is extracted by self–adaptive threshold segmenting with region connectivity analyzing. The characteristic points of both the **road boundary** and **lane marking** are matched to the straight or crooked **road** models by least–squares fit. With the circular calling of detecting and tracking blocks for mass image sequences, the whole process shows a real time and high antinoise capability. All the algorithms in the paper have been tested by the videos captured from real **road** scenes, and the experimental results proved that the detecting method is efficient, stable and accurate.
Descriptors
AUTOMATED–HIGHWAYS; COMPUTER–VISION; FEATURE–EXTRACTION; IMAGE–RECOGNITION; IMAGE–SEGMENTATION; IMAGE–SEQUENCES; OBJECT–DETECTION; **ROAD–**VEHICLES.
Classification codes
B6135E Image–recognition*;
C7445 Traffic–engineering–computing*;
C5260B Computer–vision–and–image–processing–techniques.
Keywords
road–boundary–detection; **lane–**marking–feature–extraction; intelligent–vehicle; vision–based–navigation; image–processing; self–adaptive–threshold–segmentation; image–matching; image–sequences; antinoise–capability.
Treatment codes
P Practical.
Language
English.
Publication type
Conference–paper.
Publication year
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Publication date
20070000.
Edition
2008016.

An improved algorithm for the lane recognition of structured road.

Dialog eLinks

Full text options USPTO Full Text Retrieval Options

Accession number & update

0009691750 20080115.

Source

Transactions of Beijing Institute of Technology, {Trans–Beijing–Inst– Technol–China}, 2007, vol. 27, no. 6, p. 501–5, 10 refs, ISSN: 1001–0645. Publisher: Editorial Department of Transactions of Beijing Institute of Technolgoy, China.

Author(s)

Jin–Hui, Wu–Le–lin, Chen–Hui–yan, Gong–Jian–wei.

Author affiliation

Jin Hui, Wu Le–lin, Chen Hui–yan, Gong Jian–wei, Beijing Inst. of Technol., Beijing, China.

Abstract

Based on a high–speed intelligent vehicle with machine vision, an improved algorithm of **lane** recognition is proposed. In order to obtain fine gradient images, graying, median filter, **edge** enhancement and optimal threshold are adopted to process images taken by experimental vehicle's CCD camera. **Lane edge** is **detected** according to its feature model by an improved Hough transformation. By focusing on area of interest (AOI) in pretreatment and detection, processing time is dramatically reduced. Moreover, the reliability of **lane** recognition is improved. The experimental result shows that this algorithm is of high efficiency, reliability and robustness.

Descriptors

COMPUTER–VISION; **EDGE–**DETECTION; HOUGH–TRANSFORMS; OBJECT–RECOGNITION; TRAFFIC–ENGINEERING–COMPUTING.

Classification codes

C7445 Traffic–engineering–computing*;
C5260B Computer–vision–and–image–processing–techniques;
C1130 Integral–transforms.

Keywords

improved–algorithm; **lane–**recognition; **structured–**road; high–speed–intelligent–vehicle; machine–vision; fine–gradient–images; CCD–camera; **lane–**edge; Hough–transformation; area–of–interest.

Treatment codes

P Practical;
T Theoretical–or–mathematical.

Language

English; Chinese.

Publication type

Journal–paper.

Publication year

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Publication date

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Edition

2008001.

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Extracting road boundary for autonomous vehicles via edge analysis.

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Conference information
Proceedings of the Eight IASTED International Conference on Signal and Image Processing, Honolulu, HI, USA, 14–16 Aug. 2006.

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Proceedings of the Eight IASTED International Conference on Signal and Image Processing, 2006, p. 129–32, 6 refs, pp. iv+511, ISBN: 0–88986–583–3. Publisher: ACTA Press, Anaheim, CA, USA.

Author(s)
Sunghoon–Kim, Soonyoung–Park, Kyoung–Ho–Choi. Editor(s): Hwang–J–N.

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Sunghoon Kim, Soonyoung Park, Kyoung–Ho Choi, Dept. of Electron. Eng., Mokpo Nat. Univ., Jeonnam, South Korea.

Abstract
In this paper, we present a novel algorithm to extract **road boundary** for autonomous vehicles by analyzing **road boundary** in a video sequence captured from a moving vehicle. More specifically, the proposed algorithm 1) extracts the **edge** map of an input image, 2) deletes unnecessary **edge** components that do not belong to **road boundary** and merges broken **edges** of **road boundary,** and 3) removes shadows that lead false positive of **road boundary.** In addition, extracted **edges** from multiple images, i.e., a block of images, can be successfully combined to **detect** changes of **road boundary,** making possible to notice that an intersection is **located** ahead. Experimental results are provided to show the robustness and effectiveness of the proposed algorithm under various **road** conditions such as shadows and snow, etc.

Descriptors
ARTIFICIAL–INTELLIGENCE; **EDGE–**DETECTION; FEATURE–EXTRACTION; IMAGE–SEQUENCES; MOBILE–ROBOTS; **ROAD–**VEHICLES; ROBOT–VISION; TRAFFIC–ENGINEERING–COMPUTING.

Classification codes
C7445 Traffic–engineering–computing*;
C3390C Mobile–robots;
C5260B Computer–vision–and–image–processing–techniques;
C1230 Artificial–intelligence.

Keywords
autonomous–vehicle; video–sequence; **road–**boundary–extraction; **edge–**analysis; **edge–**extraction.

Treatment codes
T Theoretical–or–mathematical;
X Experimental.

Language
English.

Publication type
Conference–paper.

Publication year
2006.

Publication date
20060000.

Edition
2007008.

Implementation of inverse perspective mapping algorithm for the development of an automatic lane tracking system.

Accession number & update
0008495534 20070101.

Conference information
TENCON 2004. 2004 IEEE Region 10 Conference, Chiang Mai, Thailand,
21–24 Nov. 2004.
Sponsor(s): IEEE Region 10.

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TENCON 2004. 2004 IEEE Region 10 Conference (IEEE Cat. No. 04CH37582), 2004, Vol. 1, p. 207–10 Vol. 1, 8 refs, pp. 4 vol. (2729), ISBN: 0–7803–8560–8. Publisher: IEEE, Piscataway, NJ, USA.

Author(s)
Muad–A–M, Hussain–A, Samad–S–A, Mustaffa–M–M, Majlis–B–Y.

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Muad, A.M., Hussain, A., Samad, S.A., Mustaffa, M.M., Dept. of Electr., Electron. & Syst. Eng., Universiti Kebangsaan Malaysia, Selangor, Malaysia.

Abstract
Vision based automatic **lane** tracking system requires information such as **lane markings, road** curvature and leading vehicle be **detected** before capturing the next image frame. Placing a camera on the vehicle dashboard and capturing the forward view results in a perspective view of the **road** image. The perspective view of the captured image somehow distorts the actual shape of the **road,** which involves the width, height, and depth. Respectively, these parameters represent the x, y and z components. As such, the image needs to go through a pre– processing stage to remedy the distortion using a transformation technique known as an inverse perspective mapping (IPM). This paper outlines the procedures involved.

Descriptors
IMAGE–REPRESENTATION; **ROAD–**VEHICLES; ROADS; TRACKING; TRAFFIC–ENGINEERING–COMPUTING.

Classification codes
C7445 Traffic–engineering–computing*;
C5260B Computer–vision–and–image–processing–techniques.

Keywords
inverse–perspective–mapping–algorithm; **automatic–**lane–tracking–system; **vision–**based–automatic–lane–tracking–system; **road–**curvature; **road–**image; preprocessing–stage; transformation–technique; foreshortening–factor; vanishing–point.

Treatment codes
P Practical.

Language
English.

Publication type
Conference–paper.

Availability
CCCC: 0–7803–8560–8/04/$20.00.

Publication year
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Multi lane line reconstruction for highway application with a signal view.

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Conference information
Proceedings. Third International Conference on Image and Graphics,
Hong Kong, China, 18–20 Dec. 2004.

Source
Proceedings. Third International Conference on Image and Graphics, 2004, p. 35–8, 9 refs, pp. xvii+588, ISBN: 0–7695–2244–0. Publisher: IEEE Computer Soc, Los Alamitos, CA, USA.

Author(s)
Zhou–Xin, Huang–Xi–yue.

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Abstract
In the intelligent transportation systems, the automatic navigation system is the active research domain. The **lane lines** reconstruction based on the computer vision is the kernel technique. This paper describes the **multi–**lane **line** reconstruction with a single view for highway application. We calibrate the camera and get the model of the **road.** Then, we **detect** the white **lane lines** and reconstruct the multi **lane lines.** This paper also analysis the basic way in keeping the **road** based on the vision model and the **lane line** model. We have experimented the system with the algorithms on highway at 150 km/h in Sichuan province and Chongqing city in China. The result shows that the algorithms can work perfectly.

Descriptors
AUTOMATED–HIGHWAYS; CAMERAS; COMPUTER–VISION; IMAGE–RECONSTRUCTION.

Classification codes
C7445 Traffic–engineering–computing*;
C5260B Computer–vision–and–image–processing–techniques.

Keywords
multilane–line–reconstruction; highway–application; intelligent–transportation–system; automatic–navigation–system; kernel–technique; vision–model; **lane–**line–model; 150–km/h.

Treatment codes
P Practical;
T Theoretical–or–mathematical;
X Experimental.

Numerical indexing
velocity: 4.2E01 m/s.

Language
English.

Publication type
Conference–paper.

Availability
CCCC: 0–7695–2244–0/04/$20.00.

Publication year
2004.

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Efficient and robust classification method using combined feature vector for lane detection.

Dialog eLinks

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Source

IEEE Transactions on Circuits and Systems for Video Technology, {IEEE–Trans–Circuits–Syst–Video–Technol–USA}, April 2005, vol. 15, no. 4, p. 528–37, 25 refs, CODEN: ITCTEM, ISSN: 1051–8215. Publisher: IEEE, USA.

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Pangyu Jeong, Nedevschi, S., Comput. Sci. Dept., Tech. Univ. of Cluj– Napoca, Romania.

Abstract

The aim of this paper is to develop a method for low–cost and accurate classification of highways and rural ways image pixels for **lane** detection. The method uses three main components: adaptive/predefined image splitting, subimage level classification and class merging based on homogeneity checking conditions. In the first step, a preclassification in **road** and nonroad pixels is carried out, on the resized input image, using the decision tree method. As a result of this first step we obtain the **road** reference feature value, and the **lane–**markings positions in case of highways. For the rural ways image splitting we use a predefined division method, and for the highways we use an adaptive division method based on the **detected lane–**markings. The proposed classification is carried out on the subimages using the K–mean classifier on a composed gray and texture based feature vector. The gray feature vector is fixed in the preclassification phase, and the texture feature vector is only updated during the classification is performed. This way the convergence is much faster and the classification accuracy is better. The resulting **road** and nonroad classes of subimages are merged into a **road** and a nonroad class using a homogeneity criterion based on the **road** reference feature value. Next, a forward and backward method is used to **detect** borders of the **road** region. Finally, we use the Kalman filter and the Bresenhem **line** drawing to connect the border pixels.

Descriptors

DECISION–TREES; IMAGE–CLASSIFICATION; IMAGE–RESOLUTION; IMAGE–TEXTURE; KALMAN–FILTERS; ROADS.

Classification codes

B6135 Optical–image–and–video–signal–processing*;
B6140B Filtering–methods–in–signal–processing;
B0250 Combinatorial–mathematics;
C5260B Computer–vision–and–image–processing–techniques*;
C1160 Combinatorial–mathematics.

Keywords

combined–feature–vector; **lane–**detection; image–pixel; rural–ways–image–splitting; subimage–level–classification; class–merging; homogeneity–checking–condition; decision–three–method; **road–**reference–feature–value; **lane–**markings–position; adaptive–division–method; K–mean–classifier; gray–feature–vector; texture–feature–vector; Kalman–filter; **Bresenhem–**line.

Treatment codes

P Practical;
T Theoretical–or–mathematical.

Language

English.

Publication type

Journal–paper.

Availability

SICI: 1051–8215(200504)15:4L.528:ERCM; 1–X.
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Digital object identifier
10.1109/TCSVT.2005.844453.
Publication year
2005.
Publication date
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Edition
2005016.

Real–time lane detection for vehicle vision navigation system.

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Accession number & update
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Source
Computer Measurement & Control, {Comput–Meas–Control–China}, Oct. 2004, vol. 12, no. 10, p. 901–4, 8 refs, ISSN: 1671–4598. Publisher: Magazine Agency of Comput. Measurement & Control, China.
Author(s)
Liu–Huasheng, Wang–Youren.
Author affiliation
Liu Huasheng, Wang Youren, Coll. of Autom., Nanjing Univ. of Aeronaut. & Astronaut., China.
Abstract
A new method for **lane** detection is presented, at first, the real **road** image can be divided into **road** region and **non–**road region based on **line** region growing, the region searched for **lane markings** is limited in the **road** region, then **lane markings** are renewed with method similar to **road** image segmentation, finally it applies linear data fitting to **find lane markings.** Simulated experiments prove the method is effective and real time, it can figure out the way stretching correctly and give warning of vehicle–deviation.
Descriptors
COMPUTER–VISION; IMAGE–SEGMENTATION; OBJECT–DETECTION; REAL–TIME–SYSTEMS; **ROAD–**VEHICLES.
Classification codes
B6135 Optical–image–and–video–signal–processing*;
C5260B Computer–vision–and–image–processing–techniques*;
C7445 Traffic–engineering–computing.
Keywords
real–time–lane–detection; vehicle–vision–navigation–system; **road–**image–segmentation; **lane–**markings; linear–data–fitting.
Treatment codes
T Theoretical–or–mathematical;
X Experimental.
Language
Chinese.
Publication type
Journal–paper.
Availability
SICI: 1671–4598(200410)12:10L.901:RTLD; 1–0.
Publication year

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Publication date

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Edition

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On–board vision system for lane recognition and front–vehicle detection to enhance driver's awareness.

Accession number & update

0008330104 20070101.

Conference information

2004 IEEE International Conference on Robotics and Automation, New Orleans, LA, USA, 26 April–1 May 2004.
Sponsor(s): IEEE Robotics and Automation Soc.

Source

2004 IEEE International Conference on Robotics and Automation (IEEE Cat. No.04CH37508), 2004, Vol.3, p. 2456–61 Vol.3, 11 refs, pp. 5726, ISBN: 0–7803–8232–3. Publisher: IEEE, Piscataway, NJ, USA.

Author(s)

Shih–Shinh–Huang, Chung–Jen–Chen, Pei–Yung–Hsiao, Li–Chen–Fu.

Author affiliation

Shih–Shinh Huang, Chung–Jen Chen, Pei–Yung Hsiao, Li–Chen Fu, Dept. of Comput. Sci. & Inf. Eng., Nat. Taiwan Univ., Taipei, Taiwan.

Abstract

The objectives of this research are to develop a driving assistance system that can **locate** the positions of the **lane boundaries** and **detect** the existence of the front–vehicle. By providing warning mechanism, the system can protect drivers from dangerousness. In **lane** recognition, Gaussian filter, peak–finding procedure, and **line–**segment grouping procedure are used to **detect** land markers successfully and effectively. On the other hand, vehicle detection is achieved by using three features, such as underneath, vertical **edge,** and symmetry property. The proposed system is shown to work well under various conditions on the roadway. The vehicle detection rate is higher than 97%. Besides, the computation cost is inexpensive and the system's response is almost real time. Thus, the results of the present research work can improve traffic safety for **on–**road driving.

Descriptors

ALARM–SYSTEMS; DRIVER–INFORMATION–SYSTEMS; OBJECT–DETECTION; OBJECT–RECOGNITION; **ROAD–**SAFETY; **ROAD–**TRAFFIC.

Classification codes

C7445 Traffic–engineering–computing*;
C5260B Computer–vision–and–image–processing–techniques.

Keywords

onboard–vision–system; **lane–**recognition; front–vehicle–detection; driving–assistance–system; warning–mechanism; traffic–safety.

Treatment codes

P Practical.

Language

English.

Publication type

Conference–paper.

Availability

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High speed road boundary detection on the images for autonomous vehicle with the multi–layer CNN.

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Conference information
ISCAS 2003. International Symposium on Circuits and Systems, Bangkok, Thailand, 25–28 May 2003.
Sponsor(s): IEEE Circuits & Syst. Soc; Mahanakorn Univ. Technol.
Source
Proceedings of the 2003 IEEE International Symposium on Circuits and Systems (Cat. No.03CH37430), 2003, vol.5, p. V–769–72 vol.5, 9 refs, pp. 5 vol.(ci+1076+962+941+915+840), ISBN: 0–7803–7761–3.
Publisher: IEEE, Piscataway, NJ, USA.
Author(s)
Hyongsuk–Kim, Seungwan–Hong, Hongrak–Son, Roska–T, Werblin–F.
Author affiliation
Hyongsuk Kim, Seungwan Hong, Hongrak Son, Div. of Electron. & Inf. Eng., Chonbuk Nat. Univ., Chonju, South Korea.
Abstract
A multi–layer CNN–based algorithm to **find** the most likely **road boundaries** on camera images is proposed for the possible application to autonomous vehicle driving. In the previous study, the Dynamic Programming (DP) is shown to be implemented with the multi–layer CNN. If the **road–**edge images are treated as the space variant distance weights, the optimal path finding algorithm of CNN–based DP can **detect** the optimal **road boundary.** Partly disconnected **boundary line** segments of roads could be linked by way of the most likely **road boundary line** segments. Fast processing speed is another advantage of the proposed CNN–based structure if it is implemented with hardware circuits. Simulation results about various different **road** images are included.
Descriptors
AUTOMATIC–GUIDED–VEHICLES; CELLULAR–NEURAL–NETS; DYNAMIC–PROGRAMMING; **EDGE–**DETECTION; PATH–PLANNING; **ROAD–**VEHICLES.
Classification codes
C5260B Computer–vision–and–image–processing–techniques*;
C1250M Image–recognition;
C5290 Neural–computing–techniques;
C1230D Neural–nets;
C1180 Optimisation–techniques;
C3360B **Road–**traffic–system–control.
Keywords
high–speed–road–boundary–detection; autonomous–vehicle–driving; multi–layer–CNN–based–algorithm; camera–images; dynamic–programming; **road–edge–**images; space–variant–distance–weights; optimal–path–finding–algorithm; **optimal–**road–boundary–detection; **disconnected–**boundary–**line–**segments; hardware–circuits; image–recognition.
Treatment codes

T Theoretical–or–mathematical.

Language
English.

Publication type
Conference–paper.

Availability
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A vision–based road edge detection algorithm.

Accession number & update
0007712619 20070101.

Conference information
IV'2002. IEEE Intelligent Vehicle Symposium. Proceedings, Versailles, France, 17–21 June 2002.
Sponsor(s): IEEE; ITSC.

Source
IV'2002. IEEE Intelligent Vehicle Symposium. Proceedings (Cat. No.02TH8607), 2003, vol.1, p. 141–7 vol.1, 3 refs, pp. 2 vol.ix+673, ISBN: 0–7803–7346–4. Publisher: IEEE, Piscataway, NJ, USA.

Author(s)
Rongben–Wang, Youchun–Xu, Libin, Yufan–Zhao.

Author affiliation
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Abstract
In the paper, a **road edge** identification algorithm is developed. The new idea of this method is to use natural **road edge,** as well as the white strip for **road** information acquisition. The natural **road edge** does not be easily polluted like the white **lane** maker does, so it indicates better adaptability to the outdoor environment. In the algorithm, we use both the pixel feature and the frame feature to identify the **road edge,** which is referred to as the whole **road** model. Because several **road** constrains is used to ensure the **road edge** detection, the algorithm is immune to the influence of the image disturbance. The algorithm of the **road edge** identification includes two stages: initialization detection and tracing detection. The initialization stage **detects** the **road edge** from the whole **road** image. The trace algorithm uses the region of interest (ROI) to **limit** detecting area, which can save much time. In order to give a measure of the reliability of the **road** detecting result, this paper presents a **road edge** identification estimation function, which can estimate the reliability of the **road edge.**

Descriptors
EDGE–DETECTION; MOBILE–ROBOTS; RELIABILITY; **ROAD–**VEHICLES; ROBOT–VISION.

Classification codes
B6135E Image–recognition*;
C3360B **Road–**traffic–system–control*;
C7420 Control–engineering–computing;
C3390C Mobile–robots;
C5260B Computer–vision–and–image–processing–techniques.

Keywords
vision–based–road–edge–detection–algorithm; **road–**edge–identification–algorithm; white–strip; **road–**information–acquisition; image–disturbance; initialization–detection; tracing–detection; trace–algorithm; detecting–area–limitation; **road–**edge–identification–estimation–function; reliability–estimation.
Treatment codes
P Practical.
Language
English.
Publication type
Conference–paper.
Digital object identifier
10.1109/IVS.2002.1187942.
Publication year
2003.
Publication date
20030000.
Edition
2003032.
Copyright statement
Copyright 2003 IEE.

Recovering the 3D shape of a road by on–board monocular vision.

Accession number & update
0006873654 20070101.
Conference information
Proceedings of 15th International Conference on Pattern Recognition, Barcelona, Spain, 3–7 Sept. 2000.
Source
Proceedings 15th International Conference on Pattern Recognition. ICPR–2000, 2000, vol.1, p. 325–8 vol.1, 14 refs, pp. 4 vol.(xxxi +1134+xxxiii+1072+1152+xxix+881), ISBN: 0–7695–0750–6. Publisher: IEEE Comput. Soc, Los Alamitos, CA, USA.
Author(s)
Chausse–F, Aufrere–R, Chapuis–R. Editor(s): Sanfeliu–A, Villanueva–J–J, Vanrell–M, Alquezar–R, Eklundh– J–O, Aloimonos–Y.
Author affiliation
Chausse, F., Aufrere, R., Chapuis, R., LASMEA, Univ. Blaise Pascal, Aubiere, France.
Abstract
Deals with a method designed to recover the 3D geometry of a **road** from an image sequence provided by an on–board monocular monochromatic camera. It only requires the **road edges** to be **detected** in the image. The reconstruction process is able to compute (1) the 3D coordinates of the **road** axis points, (2) the vehicle's position on its **lane** and (3) the prediction of the **road edge** localization in the next images of the sequence which is very helpful for the detection phase. It also computes the confidence intervals associated with the 3D parameters. The description of the method is followed by the presentation of its most significant results.
Descriptors
COVARIANCE–MATRICES; **EDGE–**DETECTION; IMAGE–RECONSTRUCTION; IMAGE–SENSORS; IMAGE–SEQUENCES; **ROAD–**VEHICLES.
Classification codes
B6135E Image–recognition*;
B7230G Image–sensors;

B0210 Algebra;
C5260B Computer–vision–and–image–processing–techniques*;
C3240K Image–sensors;
C1110 Algebra.

Keywords

3D–shape–recovery; on–board–monocular–vision; 3D–geometry; monocular–monochromatic–camera; **road–**edges; **edge–**localization; confidence–intervals.

Treatment codes

A Application;
P Practical;
T Theoretical–or–mathematical.

Language

English.

Publication type

Conference–paper.

Availability

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Effective edge–based road lane detection.

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Conference information

Proceedings of Vision Interface '98, Vancouver, BC, Canada, 18–20 June 1998.

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Proceedings. Vision Interfaces '98, 1998, p. 287–93, 15 refs, pp. vi +491. Publisher: Canadian Inf. Process. Soc, Toronto, Ont., Canada.

Author(s)

Yung–N–H–C, Lai–A–H–S.

Author affiliation

Yung, N.H.C., Lai, A.H.S., Dept. of Electr. & Electron. Eng., Hong Kong Univ., Hong Kong.

Abstract

An **edge–**based **road lane** detection algorithm is proposed. It can **detect** the **center–**line of each **lane** in a **road** with multiple **lanes.** This algorithm employs an **edge–**based approach for extracting **edge** features of **lane markings,** kerb and other wayside objects and discriminates useful and unwanted **edges** in terms of their orientation and length with the aid of a 2D–3D coordinate transformation through a camera model, and K–means clustering. This method enables **edge** features with strong orientation and length affinity to retain and cluster, while short and isolated **edges** are eliminated. Those remaining **edges** define the **lanes** and kerbs, from which the **center–**lines of the **lanes** can be determined. Overall, the merits of this algorithm are that it is computation–efficient, it works on single or multiple **lanes** and the **center–**lines it produces are accurate enough to be useful for visual surveillance purposes.

Descriptors
AUTOMATED–HIGHWAYS; COMPUTER–VISION; **EDGE–**DETECTION; FEATURE–EXTRACTION.
Classification codes
B6135E Image–recognition*;
C7445 Traffic–engineering–computing*;
C1250M Image–recognition;
C5260B Computer–vision–and–image–processing–techniques.
Keywords
edge–based–detection; **road–**lane–detection; feature–extraction; **lane–markings;** kerb; wayside–objects; 2D–3D–coordinate–transformation; camera–model; K–means–clustering; orientation; length–affinity; visual–surveillance.
Treatment codes
P Practical;
T Theoretical–or–mathematical.
Language
English.
Publication type
Conference–paper.
Publication year
1998.
Publication date
19980000.
Edition
1999002.
Copyright statement
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Lane detection sensor for vehicle control.

Accession number & update
0006122379 20070101.
Source
Matsushita Technical Journal, {Matsushita–Tech–J–Japan}, June 1998, vol. 44, no. 3, p. 75–9, 4 refs.
Publisher: Matsushita Electric Industrial Co, Japan.
Author(s)
Yasui–N, Iisaka–A, Nomura–N.
Author affiliation
Yasui, N., Iisaka, A., Nomura, N., Autom. Electron. Dev. Center, Matsushita Commun. Ind. Co. Ltd., Japan.
Abstract
A new method of white **road–**line recognition has been proposed. The method uses image data at both low and high spatial frequencies to **detect** white **road lines.** The **lane** region is extracted using low spatial frequency data. The **edges** are determined from high spatial frequency data. The contours of white **lines** are evaluated using the extracted **lane** region. Also, the method of correcting the camera pitch angle error has been developed. White **road lines** are accurately **detected** in the range from 5 m to 40 m ahead of the vehicle at a detection rate of 99.4%. The camera pitch angle error is less than 0.02 degrees. The lateral position error of a white **road line** is within ±15 cm at 40 m ahead of the vehicle.
Descriptors
AUTOMOTIVE–ELECTRONICS; **EDGE–**DETECTION; FEATURE–EXTRACTION; **ROAD–**VEHICLES; TRANSPORT–CONTROL.
Classification codes

B8520B Automobile−electronics*;
B6135E Image−recognition;
C3360B **Road−**traffic−system−control*;
C5260B Computer−vision−and−image−processing−techniques.

Keywords

lane−detection−sensor; vehicle−control; **white−**road−line−recognition; image−data; high−spatial−frequencies; low−spatial−frequencies; **lane−**region−extraction; camera−pitch−angle−error−correction; lateral−position−error; **line−**edges−determination.

Treatment codes

N New−development;
P Practical.

Language

Japanese.

Publication type

Journal−paper.

Publication year

1998.

Publication date

19980600.

Edition

1999001.

Copyright statement

Copyright 1999 IEE.

Lane boundary detection using a multiresolution Hough transform.

Accession number & update

0005899981 20070101.

Conference information

Proceedings of International Conference on Image Processing, Santa Barbara, CA, USA, 26−29 Oct. 1997.
Sponsor(s): IEEE Signal Process. Soc.

Source

Proceedings. International Conference on Image Processing (Cat. No.97CB36144), 1997, vol.2, p. 748−51 vol.2, 8 refs, pp. 3 vol. (lii +951+892+748), ISBN: 0−8186−8183−7. Publisher: IEEE Comput. Soc, Los Alamitos, CA, USA.

Author(s)

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Abstract

Lane boundary detection is the problem of estimating the geometric structure of the **lane boundaries** of a **road** based on the images grabbed by a camera on board a vehicle. We use the Hough transform to **detect lane boundaries** with a parabolic model under a variety of **road** pavement types, **lane** structures and weather conditions. In the three− dimensional Hough space, a parabolic curve is represented as a straight **line.** To simplify the computation, the parametric space can be divided into (i) a two−dimensional space measured by the parameters which are shared by all the **lane edges,** and (ii) a one−dimensional space of the parameter which makes a distinction among different **edges** in an image. A multiresolution strategy is used to improve both the speed and accuracy of the Hough transform. Experimental results show that the proposed method is relatively less prone to the image noise and is computationally tractable.

Descriptors

EDGE–DETECTION; HOUGH–TRANSFORMS; IMAGE–RESOLUTION; PARAMETER–ESTIMATION.

Classification codes

B6140C Optical–information–image–and–video–signal–processing*;
B0290Z Other–numerical–methods;
C1250 Pattern–recognition*;
C4190 Other–numerical–methods;
C1220 Simulation–modelling–and–identification.

Keywords

lane–boundary–detection; multiresolution–Hough–transform; geometric–structure–estimation; camera; parabolic–model; **road–**pavement–types; **lane–**structures; weather–conditions; three–dimensional–Hough–space; parabolic–curve; **straight–**line; parametric–space; two–dimensional–space; one–dimensional–space; speed; accuracy; experimental–results; image–noise; **edge–**detection.

Treatment codes

T Theoretical–or–mathematical;
X Experimental.

Language

English.

Publication type

Conference–paper.

Availability

CCCC: 0 8186 8183 7/97/$10.00.

Digital object identifier

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Publication year

1997.

Publication date

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Edition

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Model–based lane recognition.

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Conference information

Proceedings of Conference on Intelligent Vehicles, Tokyo, Japan, 19–20 Sept. 1996.
Sponsor(s): IEEE Ind. Electron. Soc; Assoc. Electron., Technol. Automobile Traffic & Driving; IEEE VTS Tokyo Chapter; Int. Assoc. Traffic & Safety Sci; Japanese Soc. Artificial Intelligence; Mech. Eng. Lab., AIST, MITI; Seikei Univ; Soc. Automotive Eng. Japan; Inst. Electr. Eng. Japan; IEICE of Japan; Inst. Image Electron. Eng. Japan; Inst. Syst., Control & Inf. Eng; Japan Soc. Mech. Eng; Robotics Soc. Japan; Soc. Instrum. & Control Eng.

Source

Proceedings of the 1996 IEEE Intelligent Vehicles Symposium (Cat. No.96TH8230), 1996, p. 201–6, 6 refs, pp. viii+427, ISBN: 0–7803–3652–6. Publisher: IEEE, New York, NY, USA.

Author(s)

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Abstract

A **lane** recognition is used in various driver assist systems. The **lane** recognition **detects lane boundaries** and gets vehicle position relative to the **lane** and **lane** structure. A vision system is good for **lane** recognition because the vision can **detect lane** marks. One of the subjects for the vision system is improvement of robustness. Various methods have been tried to achieve it. We tried to improve the model– based approach for the robustness. Our main idea is the noise reduction based on narrowing a width of search area. The proposed method uses the **road** model based on the space continuity of **lane** structure. An update of the model is calculated through extended Kalman filter based on **lane** structure restriction. A search area width is estimated from covariances of the model parameters. After model parameters and their covariances are updated from observed **lane boundaries** near the vehicle, search area width for distant **lane boundaries** becomes narrower than the previous update. After the several updates, distant **lane boundaries** can be **detected** robustly with narrow search area excluding noisy image features.

Descriptors

EDGE–DETECTION; IMAGE–MATCHING; IMAGE–RECONSTRUCTION; KALMAN–FILTERS; OBSERVERS; **ROAD–**VEHICLES.

Classification codes

B6140C Optical–information–image–and–video–signal–processing*;
C5260B Computer–vision–and–image–processing–techniques*;
C3360B **Road–**traffic–system–control;
C1260 Information–theory;
C1220 Simulation–modelling–and–identification.

Keywords

model–based–lane–recognition; driver–assist–systems; **lane–**boundaries; **lane–**marks; noise–reduction; space–continuity; extended–Kalman–filter.

Treatment codes

P Practical;
T Theoretical–or–mathematical.

Language

English.

Publication type

Conference–paper.

Availability

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Digital object identifier

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Publication date

19960000.

Edition

1997007.

Copyright statement

The detection of lane boundary markings using the modified spoke filter.

Accession number & update

0005107113 20070101.

Conference information

Proceedings of the Intelligent Vehicles '95. Symposium, Detroit, MI, USA, 25–26 Sept. 1995.
Sponsor(s): IEEE Ind. Electron. Soc.

Source

Proceedings of the Intelligent Vehicles '95. Symposium (Cat. No.95TH8132), 1995, p. 293–8, 4 refs, pp. x+537, ISBN: 0–7803–2983–X. Publisher: IEEE, New York, NY, USA.

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Haga, T., Sasakawa, K., Kuroda, S., Ind. Electron. & Syst. Lab., Mitsubishi Electr. Corp., Hyogo, Japan.

Abstract

We propose a new method to **detect lane boundary markings** from the input image. In this method, pairs of parallel **line edges** of opposite direction with a given range of distance are **detected** directly. Using the geometrical constraint of parallelism, it reduces the number of false candidates for **lane boundary edges,** and simplifies the tracing and fitting processes for **line** approximation. Moreover, the process of detecting pairs of parallel **line edges** can be implemented by binary logical operations suitable for real–time processing. We have developed an item of hardware called a "spoke filter board' for high–speed detection of pairs of parallel **line edges.** It is compatible with the PICIP (pipeline–path configurable image processing system) developed by the authors. The system **detects lane boundary markings** at video rate.

Descriptors

ADD–ON–BOARDS; AUTOMOTIVE–ELECTRONICS; **EDGE–**DETECTION; FILTERS; IMAGE–PROCESSING–EQUIPMENT.

Classification codes

B7220 Signal–processing–and–conditioning–equipment–and–techniques*;
B1270 Filters–and–other–networks;
B6140C Optical–information–image–and–video–signal–processing;
B8520B Automobile–electronics;
C5530 Pattern–recognition–and–computer–vision–equipment*;
C5260B Computer–vision–and–image–processing–techniques;
C5150 Other–circuits–for–digital–computers;
C7445 Traffic–engineering–computing.

Keywords

lane–boundary–marking–detection; modified–spoke–filter; input–image; **parallel–**line–edge–pairs; binary–logical–operations; real–time–processing; spoke–filter–board; pipeline–path–configurable–image–processing–system; PICIP.

Treatment codes

P Practical.

Language

English.

Publication type

Conference–paper.

Digital object identifier

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Publication year

1995.

Publication date

19950000.

Edition

1995044.

Autonomous land vehicle guidance by line and road following using clustering, Hough transform, and model matching techniques.

Accession number & update
0004992450 20070101.

Conference information
Proceedings of ICS'94: International Computer Symposium, Hsinchu, Taiwan, 12–15 Dec. 1994.
Sponsor(s): Ministr. Educ; Comput. Soc.

Source
1994 International Computer Symposium Conference Proceedings, 1994, vol.1, p. 89–94 vol.1, 18 refs, pp. 2 vol. xvi+1310. Publisher: Nat. Chiao Tung Univ, Hsinchu, Taiwan.

Author(s)
Guang–Shern–Cheng, Wen–Hsiang–Tsai.

Author affiliation
Guang–Shern Cheng, Wen–Hsiang Tsai, Dept. of Comput. & Inf. Sci., Nat. Chiao Tung Univ., Hsinchu, Taiwan.

Abstract
An intelligent approach to autonomous land vehicle (ALV) guidance by **line** and **road** following using clustering, Hough transform, and model matching techniques is proposed. The purpose of clustering is to separate the **road** from the other objects in an input image. Then, **road–**model matching is employed to **find** the best **road–**template which can be used to **locate** the ALV. Moreover, path **lines** in the matched **road** are extracted using the Hough transform, and **line–**model matching is used to **find** the best **line–**template which also can be used to **locate** the ALV. If no **line** can be found in the **road,** we use the matched **road–**template to **locate** the ALV. But if **lines** exist, we use them to **locate** the ALV. Several successful navigations show that the proposed approach is effective for ALV guidance in common roads.

Descriptors
COMPUTER–VISION; HOUGH–TRANSFORMS; MOBILE–ROBOTS; PATH–PLANNING; POSITION–CONTROL.

Classification codes
C3390C Mobile–robots*;
C3120C Spatial–variables–control;
C1250 Pattern–recognition;
C5260B Computer–vision–and–image–processing–techniques.

Keywords
autonomous–land–vehicle; guidance; **road–**following; clustering; Hough–transform; model–matching; **road–**model–matching; **road–**template.

Treatment codes
P Practical.

Language
English.

Publication type
Conference–paper.

Publication year
1994.

Publication date
19940000.

Edition
1995026.

Copyright statement

Search Strategy

No.	Database	Search term	Info added since	Results
1	INZZ	(lane OR lanes OR road) NEAR (edge OR edges OR line OR lines OR boundar$3 OR limit$1 OR marking$1)	unrestricted	1251
2	INZZ	detect$2 OR find$2 OR locat$2	unrestricted	792478
3	INZZ	1 AND 2	unrestricted	361
4	INZZ	1 SAME 2	unrestricted	350
5	INZZ	1 WITH 2	unrestricted	186
6	INZZ	1 NEAR 2	unrestricted	149

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